

# PATENT SPECIFICATION (11)

1 435 504

(21) Application No. 7395/72 (22) Filed 17 Feb. 1972

(23) Complete Specification filed 17 May 1973

(44) Complete Specification published 12 May 1976

(51) INT. CL.<sup>2</sup> A24C 5/50

(52) Index at acceptance

A2C 1E3 2B

A2M 3F 3N



## (54) CIGARETTE FILTER

(71) I, NICHOLAS WALD, a British subject, formerly of 35 Briardale Gardens, London, NW3 7PN, and now of 22 Staverton Road, Oxford, OX2 6XZ, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to filters for smoke from tobacco or tobacco substitute, and is especially concerned with filtering cigarette smoke.

The invention provides a filter for smoke from tobacco or a tobacco substitute, which includes means for removing at least some carbon monoxide from smoke passing through the filter which means comprises a material capable of catalysing the oxidation of carbon monoxide to carbon dioxide under use conditions, there being provided a desiccant arranged to reduce the quantity of water or water vapour to which the catalyst is exposed.

The invention stems from the appreciation that, while there is insufficient carbon monoxide in tobacco smoke to cause asphyxiation, the presence of carbon monoxide may nevertheless be harmful as being associated with the development of arterial disease.

It will almost certainly be found to be difficult or impossible to extract the whole carbon monoxide content of tobacco smoke, but it is believed that some benefit will accrue from even a small reduction in the concentration of carbon monoxide in inhaled tobacco smoke.

The carbon monoxide remover comprises a material capable of catalysing the oxidation of carbon monoxide to carbon dioxide under use conditions. Preferably, the catalyst comprises a mixture of about 60% manganese dioxide and about 40% copper oxide. The optimum catalytic effect is obtained if the catalyst has small particle size (say, from 0.8 to 1.6 mm. B.S.S. sieve), low bulk density, and a large surface area (advantageously at least 150 M<sup>2</sup>/g. and preferably 200±10 M<sup>2</sup>/g. The practicable upper limit for surface area may be of the

order of 250—300 M<sup>2</sup>/g. An especially suitable material is that known by the trade name "Hopcalite", which has the chemical composition indicated above.

As regards particle size, it will be appreciated that, while relatively higher catalytic activity is associated with smaller particle size, such particles offer correspondingly greater resistance to smoke flow.

The efficiency of a catalyst such as Hopcalite is impaired by the presence of water or water vapour, and there is provided a desiccant arranged to reduce the quantity of water or water vapour to which the catalyst is exposed. Examples of suitable chemical desiccants include silica gel, and lithium bromide on a charcoal base.

A catalyst in particulate form may be incorporated in the mass of fibres, preferably cellulosic, constituting the usual cigarette filter tip. The fibres may be given an adhesive coating for this purpose. Instead, the catalyst or other filter may be positioned in the flow passage of a cigarette holder or pipe, preferably in a cavity formed for the purpose. As a further possibility, some reduction in the carbon monoxide level may be effected by incorporating a particulate catalyst within the tobacco or like material itself. Such arrangements are especially advantageous in that the heat produced by combustion of the tobacco serves to assist in maintaining the catalyst relatively dry.

Another suitable arrangement is one in which a mass of the catalyst is located immediately adjacent to the filter tip of a cigarette at the end remote from the smoker.

The invention further provides a cigarette, pipe, or cigarette holder incorporating a filter in accordance with the invention. The term "cigarette" used herein includes, where the context permits, cigars and cigarillos.

The following Example illustrates the invention:

### EXAMPLE

Ten identical filter-tip cigarettes were made, each with the same quantity of "Hopcalite" (and associated desiccant) positioned,

between the filter tip and the tobacco and immediately adjacent to the tip.

5 A blood sample was taken from the subject for the purpose of determining the initial carboxyhaemoglobin value. The subject then smoked five of the cigarettes, through a "Ronson" (Trade Mark) cigarette holder, at intervals over a period of about 3½ hours. A further blood sample was taken.

10 The subject then smoked the remaining five cigarettes at intervals over a period of about 2½ hours, after which a final blood sample was taken.

15 In order to provide a basis for comparison, the same subject, but at a different sitting, smoked a further ten cigarettes through the "Ronson" holder. The second ten cigarettes were identical with the first excepting only that no "Hopcalite" or associated desiccant was included. Blood samples were taken at the same stages as before.

20 Analysis of the blood samples for carboxyhaemoglobin showed that the level of carbon monoxide in the subject's blood was at all times considerably lower while smoking the cigarettes having the "Hopcalite" filter than while smoking the comparison cigarettes.

#### WHAT I CLAIM IS:—

30 1. A filter for smoke from tobacco or a tobacco substitute, which includes means for removing at least some carbon monoxide from smoke passing through the filter which means comprises a material capable of catalysing the oxidation of carbon monoxide to carbon dioxide under use conditions, there being provided a desiccant arranged to reduce the quantity of water or water vapour to which the catalyst is exposed.

35 2. A filter as claimed in claim 1, wherein the catalyst comprises a mixture of about 60% manganese dioxide and about 40% copper dioxide.

40 3. A filter as claimed in claim 1 or claim 45 2, wherein the catalyst comprises a particu-

late material having a surface area of at least 150 M<sup>2</sup>/g.

4. A filter as claimed in claim 3, wherein the said surface area is 200 ± 10 M<sup>2</sup>/g.

5. A filter as claimed in any one of claims 1 to 4, wherein the catalyst is a particulate material having a size distribution which is such that substantially all of the particles are within the size range 0.8 to 1.6 mm.

6. A filter as claimed in any of claims 1 to 5, wherein the desiccant means comprises silica gel or comprises lithium bromide on a charcoal base.

7. A filter as claimed in any one of claims 1 to 6, wherein the catalyst is incorporated within the mass of fibres constituting a cigarette filter tip.

8. A filter as claimed in claim 7, wherein the fibres comprise cellulosic fibres.

9. A filter as claimed in claim 7 or claim 8, wherein the catalyst is bonded to the fibres by means of an adhesive material.

10. A filter as claimed in any one of claims 1 to 6, wherein the catalyst is positioned in the flow passage of a cigarette holder or pipe.

11. A filter as claimed in any one of claims 1 to 6, which is incorporated within a cigarette or the like and wherein the catalyst is admixed with the tobacco or tobacco substitute material itself.

12. A filter as claimed in any one of claims 1 to 6, wherein a mass of the catalyst is located immediately adjacent to the filter tip of a cigarette at the end remote from the smoker.

13. A cigarette, pipe, or cigarette holder, which incorporates a filter as claimed in any one of claims 1 to 12.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1976.  
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY  
from which copies may be obtained.